

AMENDMENTS TO THE CLAIMS

Following is a listing of all claims in the present application, which listing supersedes all previously presented claims:

Listing of Claims:

1. (Previously Presented) A method for identifying types of defects of an object, comprising:
 - irradiating first and second lights having different polarizations onto an inspection spot on the object;
 - collecting first and second scattered lights generated by the respective irradiated first and second lights scattering from the inspection spot;
 - identifying types of defects in the object based on the first and second scattered lights;
 - determining, based on the identified types of defects, whether the defects exceed a predetermined level; and
 - altering a manufacturing process when the defects exceed the predetermined level, wherein identifying the types of defects includes:
 - identifying a first type of defect based on both the first scattered light and the second scattered light, and
 - identifying a second type of defect based on only one of the first scattered light and the second scattered light.
2. (Cancelled).

3. (Previously Presented) The method as claimed in claim 1, wherein irradiating the first light and the second light comprises:

generating a first polarized light and a second polarized light from the first light and the second light, respectively, using a polarizer.

4. (Previously Presented) The method as claimed in claim 3, wherein the first polarized light and the second polarized light are two different polarizations selected from the group consisting of a primary polarized (P) light, a secondary polarized (S) light and a circular polarized (C) light.

5. (Cancelled).

6. (Previously Presented) The method as claimed in claim 1, further comprising:
providing a first light source for emitting the first light; and
providing a second light source for emitting the second light, wherein the second light source is positioned opposite to the first light source.

7. (Previously Presented) The method as claimed in claim 1, wherein irradiating the first light and the second light onto the inspection spot comprises:
irradiating a main light from a light source; and
generating the first light and the second light from the main light.

8. (Original) The method as claimed in claim 7, wherein the first light is directly generated from a first portion of the main light, and the second light is generated by changing a path of a second portion of the main light.

9. (Previously Presented) The method as claimed in claim 8, further comprising:
providing a light path changing member including a first mirror passing the first portion of the main light to generate the first light and reflecting the second light to a second mirror, the second mirror reflecting the second light to a third mirror, the third mirror reflecting the second light to a fourth mirror, and the fourth mirror reflecting the second light onto the inspection spot, the first, second, third, and fourth mirrors forming four points, respectively, of a rectangular path for the second light;

wherein the first light and the second light are generated from the main light using the light path changing member, and the second light is irradiated onto the inspection spot by being reflected from the first, second, third, and fourth mirrors.

10. (Previously Presented) The method as claimed in claim 9, wherein the second light reflected from the fourth mirror is irradiated onto the inspection spot from a direction opposite to a direction of the first light passing through the first mirror onto the inspection spot.

11. (Previously Presented) The method as claimed in claim 1, wherein a first polarized light and a second polarized light are generated using polarizers disposed on paths of the first light and the second light, respectively, and the first polarized light and the second polarized light are two different lights selected from the group consisting of a primary polarized (P) light, a secondary polarized (S) light and a circular polarized (C) light.

12. (Cancelled).

13. (Previously Presented) The method as claimed in claim 1, wherein the first and second lights having different polarizations are generated from a single light source.

14. (Previously Presented) The method as claimed in claim 1, wherein the first and second lights are irradiated onto an incident face of the object at an angle of about 10° to about 30° with respect to a surface of the incident face.

15. (Previously Presented) The method as claimed in claim 1, wherein the first and second scattered lights are collected at an angle in a range of about 40° to about 50° with respect to an irradiation direction of the first and second lights toward the inspection spot.

16-17. (Cancelled).

18. (Previously Presented) The method as claimed in claim 1, further comprising: identifying a type of defect with respect to size.

19. (Previously Presented) An apparatus for identifying types of defects of an object, comprising:

light creating means configured to emit first and second lights having different polarizations on an inspection spot on the object;

a detecting member configured to collect first and second scattered lights that are created from the respective first and second lights scattering from the inspection spot; and

a classifier coupled to the detecting member, wherein:

the classifier is configured to identify a first type of defect in the object based on both the first scattered light and the second scattered light, and

the classifier is configured to identify a second type of defect in the object based on only one of the first scattered light and the second scattered light.

20. (Previously Presented) The apparatus as claimed in claim 19, wherein the light creating means comprises:

a light source; and
a polarizer disposed on a path between the light source and the inspection spot to create polarized light and to control characteristics of the polarized light.

21. (Previously Presented) The apparatus as claimed in claim 20, wherein the polarizer generates one or more of a primary polarized (P) light, a secondary polarized (S) light and a circular polarized (C) light.

22. (Previously Presented) The apparatus as claimed in claim 21, wherein the polarizer comprises at least one of a 1/2 wavelength plate and a 1/4 wavelength plate to create the polarized lights by combining the plates.

23. (Previously Presented) The apparatus as claimed in claim 19, wherein the light creating means comprises at least one laser source for irradiating light onto the object within a range of angles of about 10° to about 30° with respect to a surface of the object.

24. (Previously Presented) The apparatus as claimed in claim 19, wherein the detecting member comprises:

at least one detector disposed above a surface of the object within a range of angles of about 40° to about 50° relative to a direction of light emitted toward the inspection spot.

25. (Previously Presented) A method for identifying types of defects of an object, comprising:

irradiating a first polarized light onto an inspection spot on the object;

collecting a first scattered light created by the first polarized light scattering from the inspection spot using a first detector;

irradiating a second polarized light onto the inspection spot;

collecting a second scattered light created by the second polarized light scattering from the inspection spot using a second detector;

identifying types of defects in the object based on the first and second scattered lights;

determining, based on the identified types of defects, whether the defects exceed a predetermined level; and

altering a manufacturing process when the defects exceed the predetermined level, wherein identifying the types of defects includes:

identifying a first type of defect based on both the first scattered light and the second scattered light, and

identifying a second type of defect based on only one of the first scattered light and the second scattered light.

26. (Previously Presented) The method as claimed in claim 25, wherein the first polarized light and the second polarized light are oppositely irradiated onto the inspection spot within a range of angles of about 10° to about 30° relative to an irradiated surface of the object.

27. (Previously Presented) The method as claimed in claim 25, wherein the first scattered light and the second scattered light are collected within a range of angles of about 40° to about 50° relative to irradiating directions of the first polarized light and the second polarized light toward the inspection spot.

28. (Original) The method as claimed in claim 25, wherein the first polarized light and the second polarized light are two different lights selected from the group consisting of a primary polarized (P) light, a secondary polarized (S) light and a circular polarized (C) light.

29. (Previously Presented) An apparatus for identifying types of defects of an object, comprising:

a first light source configured to irradiate a first polarized light onto an inspection spot on the object;

a first detector configured to collect a first scattered light that is created from the first polarized light scattering from the inspection spot;

a second light source configured to irradiate a second polarized light onto the inspection spot;

a second detector configured to collect a second scattered light that is created from the second polarized light scattering from the inspection spot; and

a classifier coupled to the first and second detectors, wherein:

the classifier is configured to identify a first type of defect in the object based on both the first scattered light and the second scattered light, and the classifier is configured to identify a second type of defect in the object based on a signal corresponding to only one of the first scattered light and the second scattered light.

30. (Previously Presented) The apparatus as claimed in claim 29, wherein the first light source and the second light source are disposed to face one another at opposite sides of the object and at a range of angles of about 10° to about 30° with respect to a surface of the object.

31. (Previously Presented) The apparatus as claimed in claim 29, wherein the first detector and the second detector are disposed above a surface of the object within a range of angles of about 40° to about 50° relative to irradiating directions of the first and second light sources toward the inspection spot.

32. (Previously Presented) The apparatus as claimed in claim 29, further comprising:

a first polarizer disposed on a path of the first light source and including a 1/2 wavelength plate and a 1/4 wavelength plate to generate one selected from the group consisting of a primary polarized (P) light, a secondary polarized (S) light and a circular polarized (C) light from the first light source; and

a second polarizer disposed on a path of the second light source and including a 1/2 wavelength plate and a 1/4 wavelength plate to generate a different one selected from the

group consisting of the primary polarized (P) light, the secondary polarized (S) light and the circular polarized (C) light from the second light source.

33. (Previously Presented) A method for classifying defects of an object, comprising:

- irradiating a main light onto a light path changing member;
- creating a first polarized light and a second polarized light from light split from the main light;
- collecting a first scattered light created by the first polarized light scattering from an inspection spot on the object using a first detector;
- collecting a second scattered light created by the second polarized light scattering from the inspection spot using a second detector; and
- identifying types of defects in the object based on the first and second scattered lights;
- determining, based on the identified types of defects, whether the defects exceed a predetermined level; and
- altering a manufacturing process when the defects exceed the predetermined level, wherein identifying the types of defects includes:
 - identifying a first type of defect based on both the first scattered light and the second scattered light, and
 - identifying a second type of defect based on only one of the first scattered light and the second scattered light.

34. (Previously Presented) The method as claimed in claim 33, further comprising:

providing a light path changing member including a first mirror passing a first portion of the main light and reflecting a second portion of the main light to a second mirror, the second mirror reflecting the second portion of the main light to a third mirror, the third mirror reflecting the second portion of the main light to a fourth mirror, and the fourth mirror reflecting the second portion of the main light onto the inspection spot, the first, second, third, and fourth mirrors forming four points, respectively, of a rectangular path for the second light,

wherein the first portion of the main light and the second portion of the main light are generated from the main light using the light path changing member, and the second portion of the main light is irradiated onto the inspection spot by being reflected from the first, second, third, and fourth mirrors.

35. (Previously Presented) The method as claimed in claim 33, wherein the first polarized light and the second polarized light are created using polarizers disposed on a path of a first portion of the main light and on a path of a second portion of the main light, respectively, wherein the first polarized light and the second polarized light are two different lights selected from the group consisting of a primary polarized (P) light, a secondary polarized (S) light and a circular polarized (C) light.

36. (Previously Presented) An apparatus for identifying types of defects of an object, comprising:

a light source configured to irradiate a main light;
a light path changing member configured to pass therethrough a first portion of the

main light and change a path of a second portion of the main light;

 a first polarizer configured to create a first polarized light from the first portion of the main light;

 a second polarizer configured to create a second polarized light from the second portion of the main light;

 a first detector configured to collect a first scattered light that is created from the first polarized light scattering from an inspection spot on the object;

 a second detector configured to collect a second scattered light that is created from the second polarized light scattering from the inspection spot; and

 a classifier coupled to the first and second detectors, wherein:

 the classifier is configured to identify a first type of defect in the object

 based on both the first scattered light and the second scattered light, and

 the classifier is configured to identify a second type of defect in the object

 based on a signal corresponding to only one of the first scattered light and the

 second scattered light.

37. (Previously Presented) The apparatus as claimed in claim 36, wherein the light path changing member comprises a first mirror passing the first portion of the main light and reflecting the second portion of the main light to a second mirror, the second mirror reflecting the second portion of the main light to a third mirror, the third mirror reflecting the second portion of the main light to a fourth mirror, and the fourth mirror reflecting the second portion of the main light onto the inspection spot, the first, second, third, and fourth mirrors forming four points, respectively, of a rectangular path for the second portion of the main light.

38. (Previously Presented) The apparatus as claimed in claim 36, further comprising:

a first polarizer disposed on a path of the first portion of the main light and including a 1/2 wavelength plate and a 1/4 wavelength plate to generate one light selected from the group consisting of a primary polarized (P) light, a secondary polarized (S) light and a circular polarized (C) light from the first portion of the main light; and

a second polarizer disposed on a path of the second portion of the main light and including a 1/2 wavelength plate and a 1/4 wavelength plate to generate a different one selected from the group consisting of the primary polarized (P) light, the secondary polarized (S) light and the circular polarized (C) light from the second portion of the main light.

39. (Previously Presented) The method as claimed in claim 1, wherein irradiating the first and second lights having different polarizations includes, in sequence, irradiating the first light having a first polarization onto the inspection spot, and irradiating the second light having a second polarization onto the inspection spot.

40. (New) The method as claimed in claim 1, wherein identifying the first type of defect based on both the first scattered light and the second scattered light includes determining a distribution of the collected first and second scattered lights.

41. (New) The method as claimed in claim 40, wherein determining the distribution of the collected first and second lights includes establishing a transition line.

42. (New) The method as claimed in claim 1, wherein identifying the second type of defect based on only one of the first scattered light and the second scattered light includes determining that a defect corresponds to a first region of a distribution of one of the first scattered light and the second scattered light.

43. (New) The method as claimed in claim 25, wherein identifying the first type of defect based on both the first scattered light and the second scattered light includes determining a distribution of the collected first and second scattered lights.

44. (New) The method as claimed in claim 43, wherein determining the distribution of the collected first and second lights includes establishing a transition line.

45. (New) The method as claimed in claim 25, wherein identifying the second type of defect based on only one of the first scattered light and the second scattered light includes determining that a defect corresponds to a first region of a distribution of one of the first scattered light and the second scattered light.

46. (New) The method as claimed in claim 33, wherein identifying the first type of defect based on both the first scattered light and the second scattered light includes determining a distribution of the collected first and second scattered lights.

47. (New) The method as claimed in claim 46, wherein determining the distribution of the collected first and second lights includes establishing a transition line.

48. (New) The method as claimed in claim 33, wherein identifying the second type of defect based on only one of the first scattered light and the second scattered light includes determining that a defect corresponds to a first region of a distribution of one of the first scattered light and the second scattered light.